

Design for a Novel Recombinant Influenza Vaccine Facility in Brazil
The Creation and Building of Trust in an Online Voting System to Improve Voter Turnout

A Thesis Prospectus

In STS 4500

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Bachelor of Science in Computer Science

By

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Technical Team Members:

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

On January 6, 2021, over 2000 people stormed the capitol building in protest of the 2020 presidential election results (Duignan, 2023). As people watched an act of domestic terrorism be committed on national television, they realized that over 200 years integrity and trust in the United States election system had been corroded in a little more than two months. This corrosion was spearheaded by an outcry from the losing candidate, former president Donald Trump, and other members of the republican party often claiming that the election was “stolen” and illegitimate, with some of these representatives still being vocal to this day (Associated Press, 2024).

The 2020 presidential election was also the largest voter turnout in US history with 154.6 million Americans going to the polls (United States Census Bureau, 2022). This is a result of a very active campaign being run to encourage people to get registered, through things like the use of the website [vote.gov](https://www.vote.gov), which provides information on how to register in your state. Celebrities, such as Taylor Swift, also began encouraging their fans to register and vote, even endorsing candidates in the process. However, despite this push for registration and turnout, only two-thirds of all eligible voters cast a ballot in the election, a shockingly low percentage.

This thesis will look into how distrust and conspiracies spread, especially those surrounding election results, and how we can design a new system that maximizes voter turnout by making it an easy and efficient process. Designing a new system would involve significant investment of both time and money, so it is important to understand where the current one lacks and what considerations must be put into a theoretical new one to prevent it from having the

same pitfalls. Emphasis must be placed on publically provable security as well as ease of use for all demographics, including both the poor and the elderly.

Technical Topic

The H1N1 influenza pandemic of 1918 resulted in over 500 million individuals infected, one third of the world's population, and around 50 million deaths. (National Archives, 2020). The first influenza vaccine was developed in 1938, and since then billions of dollars have been spent to ensure that the vaccine is effective and widely available for low or no cost. This is a luxury that we have grown accustomed to in the United States, however in South America they have a very different experience. With only 21.3% getting the influenza vaccine in 2024, the need to provide low cost vaccines in South America is paramount. Because of this, a proposition is being made to put a facility to produce the vaccines in Brazil. This facility would require an enormous amount of software, which as a Computer Science major I could help provide.

One software that will be utilized is an Enterprise Resource Planning (ERP) software. The group doing this capstone project is currently using SAP ERP, which was developed by the german company SAP SE in 1972 and received updates through 2016. Due to its age, the members of the group have described it as both confusing and clunky. Additionally, an external ERP would contain a hefty licensing fee that would have to be paid annually. Creating an in-house version would allow it to be tailored to the facility making it more user friendly. The company would also no longer have to pay the licensing fees, but some of all of the money saved from this would go to the salaries of the developers. However, this is still a benefit. In house software allows for expedited bug fixing and end users to communicate with the developers directly to make a better user experience and ultimately resulting in more productive employees.

STS Topic

Research Question

My STS topic is looking into the current United States federal election system and will seek to answer two questions: First, how do we create elections that are both secure as well as transparent? Second, how do we maximize voter turnout without compromising election security? The goal of the first question is to lay the foundation for the second one. In the final paper, I will make a case for the United States Government to invest in the infrastructure required to make voting online a valid way of casting a ballot in federal elections. This is not some fairytale system either. Estonia has hosted online national elections since 2005 using their i-voting system. My paper will hopefully show that this system would improve voter turnout to create more representative elections and improve the trust citizens have in the security of our elections.

Relevant Groups

National elections impact every US citizen, so the largest relevant group is the US population as a whole. However, this is not particularly useful aside from broad statistics, so we will be dividing it up in two ways: Age and Class.

Age is an important qualifier because of the strong correlation between age and ability to use electronic devices. It is no secret that older people often struggle with the use of devices, and older people have the highest turnout at election time. This requires a system that is easy to use for everyone and is accessible to those with hearing and visual impairments.

Class is also an important qualifier because of the resources required for an individual to vote from home. In order to do so, one must have both an electronics device as well as an internet or cellular connection. While the majority of Americans possess both of these, the poorest citizens may struggle to have either. Mobile phones and laptops cost hundreds if not thousands of dollars and internet access is an additional monthly cost. Precautions must be put in place to prevent poorer Americans from being unable to vote.

You may wish to argue that not dividing based on race is a mistake. However any negative impact of an online voting system would not be strictly because they are a part of these groups. While it is true that the majority of poorer Americans are minorities, it is not their race that would make them marginalized. If we were to magically alter reality and instantly make minorities richer and white Americans poorer, white people would become the marginalized ones. Because of this, I believe class is a far more important qualifier to create groups with and any mentions of potential racism will be in regards to correlation, not causation.

Methods and Framework

Two methods will be utilized to research the questions. The first will be a poll. Young voters are the least likely to cast a ballot in elections and therefore have the most to gain from this system. Charlottesville conveniently has a very high population of people in this demographic, so polling them for what would make them vote is very valuable. The second will be qualitative research. Parts of this will include reading studies on voter trust surrounding election systems, mainly how distrust begins and how it spreads. However, the largest part of this research will be looking into how Estonia created a polling system that allows its citizens to cast

their ballots fully online for national elections. This will hopefully serve as a model for how the United States could create an online voting system.

Actor-Network Theory will be applied to help answer these questions. Key actors include, but are not limited to, voters, candidates, political parties, the media, election officials, poll workers, and interest groups. There are also some non-human actors, including things like the voting technology used, that some people may not think about. Elections are also a very fragile setup, as the removal of several groups or key individuals would cause the entire system to collapse. Without voters or candidates, the system simply cannot exist. Without poll workers or election officials, the system can easily be abused and be illegitimate. Therefore, it is paramount that this delicate balance is maintained should any changes be made to the system. It is also important that the new system does not discriminate, intentionally or not, against any group of individuals. Actor-Network Theory will ensure that careful consideration is taken to marginalize any of our established groups.

Timeline

November 2024: Conduct a poll of UVA students surrounding how they vote and if they would use an online voting portal to cast their ballot. Ask additional demographic questions.

December 2024: Finalize thesis prospectus and present results.

December 2024-January 2025: Analyze data collected in the survey and determine if and how it supports my claim. Additionally research Estonia's election system and election distrust.

January 2025: Select Technical topic in CS 4991 and incorporate it into the paper.

February 2025: Complete first draft of the STS paper.

March-April 2025: Complete final draft of STS paper. Get feedback from advisors.

May 2025: Present findings and submit final paper.

Key Texts

- 1) Estonia's Webpage on their i-voting system

<https://www.valimised.ee/en/internet-voting/more-about-i-voting/introduction-i-voting>

This source will be particularly useful to determine how they set up their online voting system. Since part of my paper will be discussing the creation of a new system, it is important to understand how it is possible and what pitfalls the system has so that they can be addressed.

There are additional supplemental sources surrounding this as well including sources on cost and public trust in the system.

- 2) The efficacy of interventions in reducing belief in conspiracy theories: A systematic review

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0280902>

This study on how conspiracy theories grow and spread is very useful for understanding how election distrust starts and is spread. Obtaining and keeping public trust is very important

when creating a new election system. Preventing conspiracy theories early on will make this goal significantly easier.

3) Census Bureau Releases 2020 Presidential Election Voting Report

<https://www.census.gov/newsroom/press-releases/2022/2020-presidential-election-voting-report.html>

This webpage from the census bureau contains a large amount of useful information on voting demographics in the 2020 election. This page, along with the site as a whole, will help me gather historical data on voter turnout to help create visual aids for my data as well as hopefully support my claim

Conclusion

In conclusion, it is important to discuss these two topics together as security is necessary for the discussion of creating a new way of casting ballots. Online voting is not some purely theoretical concept with no good way of being translated to the real world. There are legitimate examples of it that we can use as a basis to model our design off of. There are a lot of stakeholders to consider which necessitate the use of the ANT framework to ensure that the new system doesn't discriminate against any group. While there is a possibility that I conclude that an online voting system is simply impractical, there will still be a lot of valuable knowledge about how to make our current system more transparent and secure.

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